CLAIMS:

1) An apparatus for treating a substrate sensitive to electromagnetic radiation, comprising;
   a) a first mask for conditioning a first beam of electromagnetic radiation and producing a first conditioned beam of electromagnetic radiation;
   b) a second mask for conditioning a second beam of electromagnetic radiation and producing a second conditioned beam of electromagnetic radiation;
   c) the first and the second conditioned beams of electromagnetic radiation being characterized in that:
      i) when they are directed toward the substrate sensitive to electromagnetic radiation, a treatment area of the substrate sensitive to electromagnetic radiation is exposed to electromagnetic radiation;
      ii) the first and the second conditioned beams of electromagnetic radiation interact to create an interference pattern over a limited portion of the treatment area.

2) An apparatus as defined in claim 1, wherein the first and the second conditioned beams of electromagnetic radiation induce an index of refraction change in the substrate sensitive to electromagnetic radiation, wherein the treatment area has two portions, a first portion and a second portion, the second portion corresponding to the limited portion, the index of refraction of the substrate sensitive to electromagnetic radiation being modified differently over the first portion than over the second portion.

3) An apparatus as defined in claim 2, wherein the index of refraction is altered substantially uniformly over the first portion.

4) An apparatus as defined in claim 4, wherein the index of refraction is altered in a non-uniform manner over the second portion.

5) An apparatus as defined in claim 4, wherein the substrate sensitive to electromagnetic radiation is a waveguide.

6) An apparatus as defined in claim 5, wherein the index of refraction changes periodically over the second portion.

7) An apparatus as defined in claim 6, wherein the second portion forms a Bragg grating.

8) An apparatus as defined in claim 7, wherein the Bragg grating has an apodization.

9) An apparatus as defined in claim 8, wherein the apodization is a Gaussian apodization.

10) An apparatus as defined in claim 9, wherein the index of refraction is altered substantially uniformly over the first portion to form a base value, the Gaussian apodization being symmetrical on either side of the base value.

11) An apparatus as defined in claim 10, wherein the waveguide defines an electromagnetic radiation propagation axis, the Gaussian apodization forming an

amplitude profile of the Bragg grating along the electromagnetic radiation propagation axis.

12) An apparatus as defined in claim 5, wherein the waveguide is an optical fiber.

13) An apparatus as defined in claim 12, wherein the first beam of electromagnetic radiation and the second beam of electromagnetic radiation belong to different diffractive orders to create the interference pattern.

14) An apparatus as defined in claim 13, comprising a source of electromagnetic radiation from which is derived the first and the second beams of electromagnetic radiation.

15) An apparatus as defined in claim 14, comprising a diffractive mask subjected to exposition of electromagnetic radiation by the source of electromagnetic radiation to produce the first and the second beams of electromagnetic radiation.

16) An apparatus as defined in claim 15, including an optical system to focus the first and the second beams of electromagnetic radiation toward the optical fiber.

17) An apparatus as defined in claim 16, wherein said source of electromagnetic radiation is coherent.

18) An apparatus as defined in claim 17, wherein the coherent electromagnetic radiation is a UV laser.

19) A substrate sensitive to electromagnetic radiation having an index of refraction modified by the apparatus defined in claim 1.

20) A method for inducing a modification of the index of refraction of a substrate sensitive to electromagnetic radiation, comprising;

a) conditioning with a first mask a first beam of electromagnetic radiation and producing a first conditioned beam of electromagnetic radiation;

b) conditioning with a second mask a second beam of electromagnetic radiation and producing a second conditioned beam of electromagnetic radiation;

c) directing the first and the second conditioned beams of electromagnetic radiation toward the substrate sensitive to electromagnetic radiation to expose a treatment area of the substrate to to electromagnetic radiation;

d) the first and the second conditioned beams of electromagnetic radiation interact to create an interference pattern over a limited portion of the treatment area.

21) A method as defined in claim 20, wherein the treatment area has two portions, a first portion and a second portion, the second portion corresponding to the limited portion, the index of refraction of the substrate sensitive to electromagnetic radiation being modified differently over the first portion than over the second portion.

22) A method as defined in claim 21, wherein the index of refraction is altered substantially uniformly over the first portion.

23) A method as defined in claim 22, wherein the index of refraction is altered in a non-uniform manner over the second portion.

24) A method as defined in claim 22, wherein the substrate sensitive to electromagnetic radiation is a waveguide.

25) A method as defined in claim 24, wherein the index of refraction changes periodically over the second portion.

26) A method as defined in claim 25, wherein the second portion forms a Bragg grating.

27) A method as defined in claim 26, wherein the Bragg grating has an apodization.

28) A method as defined in claim 27, wherein the apodization is a Gaussian apodization.

29) A method as defined in claim 28, wherein the index of refraction is altered substantially uniformly over the first portion to form a base value, the Gaussian apodization being symmetrical on either side of the base value.

30) A method as defined in claim 29, wherein the waveguide defines an electromagnetic radiation propagation axis, the Gaussian apodization forming an amplitude profile of the Bragg grating along the electromagnetic radiation propagation axis.

31) A method as defined in claim 24, wherein the waveguide is an optical fiber.

32) A method as defined in claim 31, wherein the first beam of electromagnetic radiation and the second beam of electromagnetic radiation belong to different diffractive orders to create the interference pattern.

33) A method as defined in claim 32, comprising a source of electromagnetic radiation from which is derived the first and the second beams of electromagnetic radiation.

34) A method as defined in claim 33, comprising a diffractive mask exposed to electromagnetic radiation by the source of electromagnetic radiation to produce the first and the second beams of electromagnetic radiation.

35) A method as defined in claim 34, including an optical system to focus the first and the second beams of electromagnetic radiation toward the optical fiber.

36) A method as defined in claim 35, wherein said source of electromagnetic radiation is coherent.

37) A method as defined in claim 36, wherein the coherent electromagnetic radiation is a UV laser.

38) A substrate sensitive to electromagnetic radiation processed by the method defined in claim 20.

39) An apparatus for inducing a modification of the index of refraction of a substrate sensitive to electromagnetic radiation, said apparatus comprising:

a) an optical system for generating a first beam of electromagnetic radiation and a second beam of electromagnetic radiation different from the first beam of electromagnetic radiation;

b) said optical system establishing a first propagation path for the first beam of electromagnetic radiation and a second propagation path for said second beam of electromagnetic radiation, said first and second paths causing the first and the second beams of electromagnetic radiation to converge toward the substrate sensitive to electromagnetic radiation and expose a treatment area on the substrate to electromagnetic radiation, the first and the second beams of electromagnetic radiation interacting to create an interference pattern over a limited portion of the treatment area.

40) An apparatus as defined in claim 39, wherein the treatment area has two portions, a first portion and a second portion, the second portion corresponding to the limited portion, the index of refraction of the substrate sensitive to electromagnetic radiation being modified differently over the first portion than over the second portion.

41) An apparatus as defined in claim 40, wherein the index of refraction is altered substantially uniformly over the first portion.

42) An apparatus as defined in claim 41, wherein the index of refraction is altered in a non-uniform manner over the second portion.

43) An apparatus as defined in claim 42, wherein the substrate sensitive to electromagnetic radiation is a waveguide.

44) An apparatus as defined in claim 43, wherein the index of refraction changes periodically over the second portion.

45) An apparatus as defined in claim 44, wherein the second portion forms a Bragg grating.

46) An apparatus as defined in claim 45, wherein the Bragg grating has an apodization.

47) An apparatus as defined in claim 46, wherein the apodization is a double Gaussian apodization.

48) A method for inducing a modification of the index of refraction of a substrate sensitive to electromagnetic radiation, said method comprising:

a) generating a first beam of electromagnetic radiation and a second beam of electromagnetic radiation different from the first beam of electromagnetic radiation;

b) directing the first and the second beams of electromagnetic radiation toward the substrate sensitive to electromagnetic radiation to expose a treatment area on the substrate to electromagnetic radiation, the first and the second beams of electromagnetic radiation interacting to create an interference pattern over a limited portion of the treatment area.

49) An apparatus as defined in claim 1, wherein the first and the second conditioned beams of electromagnetic radiation induce a predetermined gaseous profile in the substrate.

50) An apparatus as defined in claim 49, wherein the gaseous profile is a hydrogen profile.

51) An apparatus as defined is claim 1, wherein said first mask imparts a first cross-sectional shape to the first beam of electromagnetic radiation, said second mask imparts a second cross-sectional shape to the second beam of electromagnetic radiation, the first cross-sectional shape being different from the second cross-sectional shape.

52) An apparatus as defined in claim 51, wherein said first mask imparts a phase shift to the first beam of electromagnetic radiation.